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The Climatological Study of the USSR part

~~Climatological Research in the USSR~~

by G. T. Selyaninov

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"The Climatological Study of the USSR"

G. T. Selyaninov

The program for climatological research in the USSR considered at the special conference called by the Main Administration of the Hydrological Service in July 1950 is a historical document of Soviet climatology that demands particular attention.

The article by Professor Kh. P. Pogosyan on the theory of climate (2) which serves as the preface to the program gives a devasting critique of the entire situation of climatology. This critique amounts to an assertion that there exists confusion in the science of climatology. This confusion expresses itself in the presence of four different lines of scientific thought, each negating the other, in the absence of a satisfactory climatological theory and in the failure of the existing theories, even in questions of climatography, to meet the increasing requirements of the national economy.

Unfortunately Professor Pogosyan's critique is hardly concrete, limiting itself to unsubstantiated general allegations that lack historical basis and consistency.

An article by S. P. Khromov (8) deals sufficiently clearly with the lack of historical foundation of this critique and with its neglect of the achievements of our science. We shall not dwell on this point here confining ourselves simply to some specific observations not included in S. P. Khromov's piece.

The reasons for the difficult situation in climatology, as seen by Professor Pogosyan, derive from the fact that climatologists have been paying insufficient attention to the development of

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theoretical questions and have been drawing too little on the physical methods of studying the atmosphere. The author assumes that it is of value only to concentrate attention on the study of climate-forming factors in order to assure the creation of a theory of climate and thereby satisfy the demands of the national economy, and that "he has no thought of creating a special branch of climatography" (p. 14). It is true that in the unpublished comments to the "Program", written later, he speaks differently on this question, which indicates the instability of the author's views.

One may agree that theoretical investigation in climatology within the GMS system is at present in an embryonic state; but to assert that Russian climatology has not surpassed the state of academic climatography, useless to the national economy, is to ignore the scientific heritage of the great Voyeykov, the universally recognized founder not only of Russian but of world climatology as a science of climate-forming factors. Such a neglect of the achievements of our science and of its history places in doubt or even destroys the value of all the author's subsequent interpretations and concrete propositions notwithstanding their seeming persuasiveness.

Clearly, Professor Pogosyan's entire critical comment on climatology refers to the period of the existence of the Hydrometeorological Service within the framework of which actually the whole effort of the Main Geophysical Observatory was directed toward compiling a climatological handbook, and it is correct to say that climatographic research could not be carried on if one does not consider the work of O.A. Drozdov on rainfall.

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After Voyeykov (after 1916) climatology was, in fact, the continuation of the work of the Vild School which fully sympathized with the metaphysical tendencies of foreign science rooted especially deeply in meteorology; Vild was a typical representative of the metaphysical mentality and Voyeykov was his irreconcilable adversary. The contradiction of the positions of the two scientists on questions of research methodology and the tasks of science is shown sufficiently clearly in my work on Voyeykov (4). Professor Pogosyan obviously does not understand that Voyeykov, in contrast to Vild, was a representative of the progressive Russian intelligentsia of the 1860s, which independently adopted dialectic concepts on the basis of systematic materialism. All the work of Voyeykov is permeated by the dialectic spirit and is therefore distinguished by a breadth of theoretical outlook, practical purposefulness, strict consistency and practical meaningfulness. The works of Voyeykov were closely connected with agricultural production and Voyeykov himself personally collaborated with the great Dokuchayev and enjoyed great fame and popularity among agronomists. Professor S.P. Khromov does not tell about this with sufficient clarity. But Voyeykov did not collaborate with the Physical Observatory and found himself in sharp opposition to the management of the latter headed as it was by the above-mentioned G. Vild who neglected the demands of practical work.

For more than 100 years the Main Geophysical Observatory followed in the footsteps of Vild and it therefore was not surprising that the Stalin Plan for the transformation of nature caught the Observatory unawares and forced it to engage in work connected with the Plan after it was already in progress.

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Incidentally, the critical attitude toward modern climatolgy in Professor Pogosyan's article is based on pointing out the unsuccessful definition of the concept of climate in place of which he advocates a new and more perfect one; but it is precisely from this definition that it can be seen that the author does not grasp the essence of Voyeykov's climatological concepts and merely paraphrases positions he claims to be criticizing. Actually, would it not be possible to consider climate as "the regime of the air envelope of the earth, determined by long-term processes of interconnected actions of radiation, the underlying surface and the circulation of the atmosphere?" Consequently the atmosphere [redacted] the center of attention of the climatologist while the lithosphere and the hydrosphere and even more the biosphere, i.e. vegetation, are not at all mentioned in the determination of climate; they are referred to merely as "the underlying surface" of the atmosphere. Moreover the hydrothermal state of the soil and everything that is found on it must be looked at not within the framework of "underlying surface" but independently, as an important component of climate having an enormous bearing on the national economy. One cannot limit climate to the atmosphere; and one must examine the phenomena of the atmosphere in conjunction with the physical phenomena of the soil and vegetation as was done, in accordance with Voyeykov, in the work on agricultural climatology. On this question, evidently, we also come to a parting of the ways with Professor Khromov.

In conformity with the definition of the concept of "climate" adopted by Professor Pogosyan, temperature and moisture of the soil are given a very modest place in the Program for the description of climate.

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Very little attention is allotted to the study of snow cover, and consequently, none at all either to its climate-forming or its economic significance and, aside from this, snow is looked upon exclusively as a static phenomenon and not as a dynamic one: the dynamics are studied only in the atmosphere and it is to this question that a separate chapter of the plan is devoted not counting another chapter also concerned, in the last analysis, with an account of circulation in the atmosphere. However, it is proposed to study even the dynamics of the atmosphere in the manner of synoptic meteorology which characterizes the phenomena of the whole of climatology in far too coarse an outline, useful for the comprehension of the reasons of some climatic phenomena but possessing very little practical value. Synoptic weather characteristics, generalized climatolo ically, do not give a realistic presentation of climate as is clearly shown in the well known work of Alisov on the climates of the USSR which sums up the research in the area of the "dynamic" direction of climatology.

My work in Sochi in connection with the analysis of air masses and fronts, pointed up the helplessness of the method in the case of concrete climate characteristics, and it is only for understanding some climatic phenomena caused, in the main, by arctic and tropical intrusions, that the method is useful inasmuch as one cannot study climate anywhere without at the same time examining the weather in its surroundings, i.e. synoptically. This latter fact became clear to me long before synoptic analysis was used in climatology -- to wit, in my first climatological work "Frosts in Sochi" (5) (1915).

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The growth of this type of climatological investigation, even after using the advection-dynamic analysis developed by Professor Pogosyan cannot satisfy production.

All the remaining chapters of the plan, in spite of declarations about a new direction in climatology, repeat the old worn phrases of classical climatography; the inclusion in the plan of the study of "recurrence" (probability) phenomena, used in agricultural climatography, naturally should be welcomed, but recurrence still does not disclose the order of change of the phenomenon in terms of time (from year to year), and it is, in fact, this that presents particular interest to agriculture. Multiple probability curves are insufficient.

Predominant in the Program is the old method of climate characterization by elements, each severed from the other, while "interconnected" and "interdependent" phenomena are only mentioned, and then not at all clearly and in a limited sense, whereas the plan projects to give the generalizations and synthesis in its introductory section, before the examination of climate according to elements; here, that is, in the introductory section, it is proposed to evaluate climate for the national economy while at the end the problem of synoptic (dynamic) climatology is treated again; at the same time it is apparently acknowledged that for the practical characterization of climate neither its analysis according to elements nor a study of the dynamics is required. For whom then is the description of the climate of the Union, amounting to 30 pages with an atlas of 600 maps, intended: for a narrow circle of specialists? For the self-satisfaction of the Hydrometeorological Service? This too, is not in the spirit of Voyeykov who always wrote for a wide circle of readers.

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The program attaches only passing significance to the heat and water balance and the moisture turnover; all these problems, so vital in theory and practice are only dealt with in a general way, so that one cannot expect to derive a great deal of benefit from these investigations. How, for example, is one to make practical use of the mean annual or, in the best case, semi-annual (warm and cold seasons of the Program) values of the elements of the heat balance -- it is incomprehensible that the graphs of annual movement of the elements of the balance in the Atlas are supposed to apply only for "various points." For what points? For those for which prolonged actinometric observations are available? But there are too few of them, besides which the data for these points is acknowledged to be perfect, in connection with which there is contemplated the organization of a new network of actinometric observations, which will be in use no earlier than 10 years from now. By the method of calculation according to cloudiness and moisture of the air, one may construct balances not simply for "individual points" but one can divide the entire Union into regions as was done for the coming part of the balance in the world agroclimatic Atlas which is being prepared for publication and in the work of Berlyand for the European part of the Union.

How the moisture turnover in the country is to be studied -- this the Program fails to explain. Evidently, also by elements.

In the task, therefore, of the complete and dynamic characterization of climate and, generally, the creation of a fullfledged climatography of the USSR by means of a plan, has not been accomplished and the problem continues to remain unsolved.

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This unsatisfactory situation does not emanate from the insufficient pertinence of physics, as Professor Pogosyan supposes: but because the study of climate in geophysics has come to be something apart from production, climate is being looked on as something by itself, as a phenomenon of natural history, as soil scientists studied soil at one time and botanists studied plants. But this school of thought, progressive in its day, no longer exists in these disciplines while it still maintains itself in climatology, resting on the formal position that climatology serves no concrete production process but the national economy as a whole. And since the climatologist cannot encompass production, he generally does not study practical production, and climatology continues to remain outside the realm of production, or the contact is partial and episodic. The separation of science from practice produces a weakness of theory and, in the present case, physics naturally is not excepted.

Since science evolves from the productive process and can only develop in close harmony with it, the solution of the task must be the antithesis of that which Professor Pogosyan proposes. Climatology must not build on universal "physics" (without physics in general there can be no science), and, departing from physics must automatically meet the demands of practice, and, on the other hand, starting from the great problems of the present which require the assistance of climatology particularly urgently, it must develop climatic research to cooperate in the solution of the concrete problems of socialist construction, mainly in the direction of harnessing the natural resources of the country and developing them.

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To believe that after the development of climatological theory and the use of calculating machines all problems concerning the application of climatology to practice will be solved, is to say the least, without basis.

What contemporary problems most require the help of climatology? It is clear that without an abundance of agricultural raw materials Communism cannot go ahead with its work of building.

If it is taken into consideration that agriculture, in the wide sense of this word, i.e. including livestock raising, forestry, fishing, hunting, etc., is one of the material bases of the national economy and that light industry works mainly with agricultural raw materials, then one of the most important contemporary problems becomes clearly delineated at the first glance. The enormous importance of heavy industry within the framework of the national economy, and in particular within its technical reequipment, does not change the matter in the question under discussion since heavy industry depends on climate least of all and similarly requires the aid of climatology least of all.

So far as the demands of transport are concerned which in due course will produce a study of weather, these have narrowly specialized contents and are being satisfied by the services belonging to the railroads and aviation; this is also the case in the demands of the department of public health, which has its own meteorological network for health resorts.

It is very difficult to imagine universal "physical climatology" satisfying, among other things, the agricultural sector of the economy as would follow from Professor Pogosyan's article and

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from the Program for the climatic description of the Union proposed by him.

The special importance of the demands of agriculture on climatography derives not only from the extent of its interest to climate, but is determined by the peculiarities of agricultural production which were formulated very graphically by the founder of agronomical science -- Academician Vil'yams. According to Vil'yams the fundamental task of agriculture is the transformation of the energy of the sun's rays into potential energy of plant raw material by means of the utilization of rich soil and rainfall -- directly or, in the case of deficiencies, by a hydrological system (irrigation). In developing this concept it is necessary to see in climate a resource of the national economy and at the same time a factor dialectically influencing -- and doing so to the strongest degree -- the effective utilization of this resource.

No other branch of production utilizes climate as much to obtain output or has as complex a relation to the former as agriculture, in which unfavorable weather conditions can negate all efforts to produce a harvest; it is sufficient to point to the widespread freezing of garden produce in 1939-1940 and to the destruction in the subtropics resulting from the frosts of 1950.

Climatic phenomena, the limited and complicated utilization by agriculture of the resources of sunlight, heat and moisture, commonly called harmful meteorological phenomena, must be the chief subjects of climatological research after a study of the resources indicated. The Program, meanwhile allots very little space to them.

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Finally, considering the above-mentioned inconsistent nature of climate and its relation to agriculture, displayed particularly under the natural conditions of continental countries like the USSR where agricultural engineering, as a matter of principle, is directed toward the struggle against unfavorable weather -- the final stage of knowledge about climate logically and inevitably must be the study of the methods of its change or, more exactly, of its improvement, toward which the main efforts of Party and Government are at present directed (transformation of Nature). Nothing definite -- only general phrases are contained in the Program on this subject.

Therefore the Voyeykov direction of climatology, serving mainly the agricultural sector of the economy, representing climate in a realistic fashion and, at the same time, being distinguished by a high theoretical level (which is not true in the case of abstract "physical climatology" -- the offspring of the metaphysical thought of foreign science), must be the leading direction even in our time, with of course, further development ahead.

The classical climatology created by Voyeykov, in contrast to the pseudo-classical climatology of the Vild School, is that general point of departure of knowledge of climate which only supplements the research in the field of dynamic and complex climatography; the latter itself does not go beyond the limits of reference work and cannot be directly utilized in practice except in the most simple cases. The "physical climatology" of Professor Pogosyan is a far-fetched concept and is no more than a working theory of circulatory processes in the atmosphere, necessary to an understanding of climatic phenomena; but it has practical usefulness mainly for the weather forecasting service. The claims of "physical climatology" for anything beyond this have no basis.

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To return to the Program for the climatic description of the Union. In that part in which the Program does not leave the framework of Voyeykovian climatography it does not meet the principal objections but requires only the supplementation and reorganization pointed out above. But this supplementation and reorganization does not obviate the necessity of a special study of climate for the various branches of the national economy, particularly for agriculture.

Taking into consideration the above indicated enormous demand on climatology on the part of agricultural production, including the demands of almost all other branches of the national economy, it is legitimate to ask: is it expedient to create an overall institute of climatology within the GMS system with a large staff and financial outlay and with the risk that it might degenerate into a department of climatology. Further, taking into account that Soviet agricultural climatology (6) is a direct continuation of the Voyeykov tradition, growing, in the literal sense of this word, out of the satisfaction of the demands of a planned socialist economy, and considering also that the study of agricultural climatology, having daringly broken outdated scientific traditions, had a revolutionary influence on general climatology -- by admission of the GMS workers themselves it furthered the progressive line of scientific thought in GMS -- would it not be more reasonable to organize an Institute of Agricultural Climatology within the framework of the Academy of Sciences imeni Lenin, as a necessary element within this framework, and alongside the already existing Institutes such as Agro-Soil Science, Agrophysics, Plant Protection, Microbiology, Plant Raising, Livestock Raising etc., none of which can do without

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the assistance of climatology. The absence within this system of an Institute of Climate is glaring and is an anachronism and interferes with the integrity of the whole system of agricultural science in our country. The creation of such an institute would further the more effective work even of the Hydrometeorological Service.

Unfortunately, by the artificially created monopoly of materials from meteorological observations, the growth of specialized climatological research is inhibited, productivity is injured and the possibility of a specialized study of climate is ruled out.

To create institutes within the framework of the Hydrometeorological Service is, of course, a matter of GMS itself, but to concentrate national means for the study of climate solely within this framework is inexpedient, as was shown by the experience of the 20-year existence of the Service. The Main Administration of GMS, which considers it its basic achievement to have put in order and improved meteorological observations, at the same time curtailed the departmental meteorological network, especially -- within the framework of the old Peoples' Commissariat of Agriculture. On the whole, the majority of agricultural experimental stations which formerly gathered the most valuable materials for an understanding of the country's climate have been deprived of meteorological observations, while meteorological stations that have been maintained as experimental establishments have been neglected.

The one-sided planning of a meteorological network mainly for the purpose of the synoptic service led to concentration of meteorological observations in towns and railroad stations (that of course is more convenient for relations with the Weather Bureau);

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in fields almost no observations were carried on. In rural localities and field environments there are only 7 percent of the second class meteorological stations created under the supervision of the Hydrometeorological Service; how many stations are owned by the department of agriculture is unknown. Meanwhile it has gathered sufficient materials to show the impossibility of generalizing and extending meteorological observations produced in town or near by locations (railroad stations) to field conditions. The result is -- inadequacy and even incorrectness of information about the climate of the country in so far as it was built on the observations of the existing meteorological stations of GMS (i.e. town stations); the danger of this was pointed out by Voyeykov as many as 70 years ago, and again in 1893 (1) when he insisted that "it is necessary to transfer the center of gravity of meteorological observations from the towns to the villages, fields, forests, sea shores and mountains."

The inadequacy of the meteorological network of GMS for the tasks of the national economy is very graphically displayed by the attempts of GMS to render assistance in accomplishing plans for the transformation of Nature in our country. In order to calculate the influence of forest shelter belts on climate, the organization of a new network of meteorological stations was required, different from accepted types of establishments and utilizing recommendations offered by me in 1936 for the study of the subtropics (7) and also experimental work of Academician Vysovskiy in the Velikoanadolsk experimental forest.

On the other hand, the meteorological stations of the Hydrometeorological Service gather observations that are useless in practice.

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In particular, the synoptic service in current work is satisfied with less than half the effective network and, in the agro-meteorological bulletins published every 10 days there is printed only the most elementary information about the weather in the form of 10-day averages, more detailed information for each day being given only for one station per oblast'; moreover, the cost of a modern second class station with four observers is very great and the numerical material gathered by it for weather characterization is expressed in astronomical figures: for example, in the monthly meteorological table are placed no less than 2,000 predominantly three digit numbers, for observations of soil temperatures there are about 3,000 numbers, while from the automatic self-recorder there are 6,000 and more (up to 9,000). Need this be?

Our experimental work on agricultural evaluation of climate and the operative maintenance of the experimental establishment show that one can, without harm to the work, curtail the periods (with some modification in observation times) and volume of observations on the majority of second class meteorological stations and reduce the staff by half and, on the basis of the saving, develop the study of microclimate, phytoclimate and soil climate, not afforded by the existing network, and organize the study of thermal and water balances on a larger scale than at present and strengthen the central scientific-investigative apparatus in the field of agricultural climatology.

But this is not all. After the centralization of meteorology within the GMS system, the meteorological archives became even less accessible, the cost of using them rose incredibly and at present the accomplishment of climatic investigations outside the GMS system

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is becoming less feasible.

Twenty years of experiments by the existing Hydrometeorological Service have accumulated sufficient facts for a revision of the whole system handling meteorology for the national economy and for the general demand of the public as a whole. This revision, long in the making, must be completed in the near future.

BIBLIOGRAPHY

(1) Voyeykov, A.I., "The Objectives of Agricultural Meteorology", Meteorologicheskiy vestnik (Meteorological Herald), 1893, pages 363-374.

(2) Kashin, K.I., and Pogosyan, Kh. P., "The Problem of Climate and Climate-Forming Factors", Meteorologiya i gidrologiya (Meteorology and Hydrology), 1950, No. 2.

(3) Programma Klimatologicheskovo opisaniya SSSR i metodolicheskiye ukazaniye k ney (A Program for the Climatolo ical Description of the USSR and Methodological Instructions for It), under the editorship of R.F. Usmanov, Main Geophysical Observatory, Gidrometeoisdat, 1950.

(4) Selyaninov, G.T., "The Earth's Climates, the History of their Creation and their Meaning in the Development of Climatology", Izvestiya Vsesoyuznovo Geograficheskovo Obshchestva (News of the All-Union Geographical Society), 1948, No 1; "A.I. Voyeykov As a Scientist", Meteorologiya i gidrologiya, 1941 No 2.

Declassified in Part - Sanitized Copy Approved for Release 2012/04/23 : CIA-RDP82-00039R000200170014-7

Declassified in Part - Sanitized Copy Approved for Release 2012/04/23 : CIA-RDP82-00039R000200170014-7

(5) Selyaninov, G.T., "Frosts in Sochi", Trudy Sochinskoy opytn. st. (Works of the Sochi Experimental Station), No 5, 1915.

(6) Selyaninov, G.T., "Russian Agricultural Climatology and Its Significance in Planning Agricultural Production, Izv. Vses. Geograf. obshch., 1947, No 4.

(7) Selyaninov, G.T., "The Task of Serving the Subtropics", Meteorologiya i gidrologiya, 1936, No 4.

(8) Khromov, S.P., "The Present Status of Climatology", Izv. Vses. obshch., 1951, No 2.

Declassified in Part - Sanitized Copy Approved for Release 2012/04/23 : CIA-RDP82-00039R000200170014-7